Presentation to EDS
U.S. Manufacturing Markets

Robert Goodwin
Vice President
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Discrete Manufacturing

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Process Manufacturing

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Primary Competitors

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EDS Marketing Plan
INPUT Comments

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Systems Operations Markets and Opportunities

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Applications in Discrete Manufacturing

(1) Business operations and planning
- General accounting
- Financial reporting
- Planning
  - MRP II
  - Scheduling
- Marketing/sales
- Purchasing

(2) Engineering and design
- CAD/CAM
- Documentation
- Plant simulation
- Design engineering

(3) Factory floor
- Machine control
- Area control
- Plant monitoring

(4) Other applications
- Plant maintenance
- EDI
- Material warehousing and handling

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Discrete Manufacturing Industry

- Requires extensive planning and detail work
- Profit margins greatest for makers and sellers of end products, not components
- Make, not buy, mentality
- Value-added moving from assembly to component manufacture

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Discrete Manufacturing Operations

- Viewed as a cost center
- Inventory seen as asset
- Downward, not upward, communication
- Many purchases within local authorization limits

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Discrete Manufacturing Products

- Shorter life cycles
- More models
- Major design changes between product releases
- Differentiate for success

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Discrete Manufacturing Managers

- Line
  - Doers, not thinkers
  - Promoted from the skilled trades
  - Older
  - Fear of automation
  - Limited mathematical backgrounds
- Senior
  - Myopic
  - Trying to regain power from finance, sales, marketing
  - 90-day focus
  - Protect salaries, bonuses, promotions

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IS Issues and Implications

Area	Issue	Implications for IS Vendors
Markets	• Declining share of world-wide markets • Major deficit in U.S. merchandise trade balance • Heavy competition from lower-cost foreign firms	• Increased interest in improving production efficiencies
	• Need for companywide automation strategies	• More-rapid obsolescence of older automated systems • More frequent company wide systems contracts with vendors • Systems integration approach
	• Need for increased inter-departmental planning and coordination	• Need for more education and training services • Professional services opportunities

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IS Issues and Implications
(Cont.)

Area	Issue	Implications for IS Vendors
Production	• Interest in computer-integrated manufacturing - Focus on factory floor - Limited understanding of CIM concept • Instant Communication	• Integrate controllers, then islands of automation • Provide educations and training services • Physical linkage of shop floor and engineering systems via telecommunications • Factory floor LANs + Office LANs • Standardization of network protocols (e.g., MAP) • Need for electronic information interchanges between suppliers, manufacturers, and dealers.

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Market Trends in Discrete Manufacturing

- Large market, still growing at 17%
- High-end MRPII saturation
- Micro-based solutions and workstations
- Need for integrated systems

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Operational Trends in Discrete Manufacturing

- Decentralized operations
- Rapid growth in CAD/CAM, but on less expensive platforms
- Delayed CIM

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Key Events: Reorganizations

- Digital—alliances
- EDS—lost leverage from GM?
- IBM focus on CIM through ASD

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Driving Forces

- Increased competition
- Decentralization
- Workstations and design software

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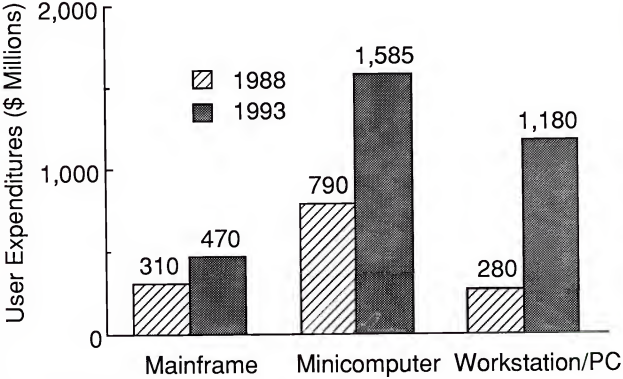
User Expenditures for Application Software by Platform Size 1988-1993



	Mainframe	Minicomputer	Workstation/PC
1988-1993 CAGR (Percent)	8	15	34

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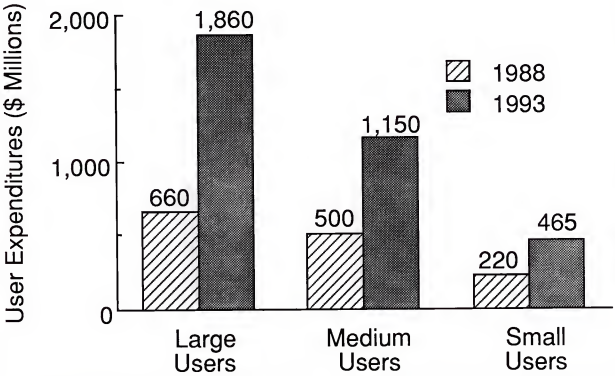
User Expenditures for Application Software by Size of User Organization 1988-1993



	Large Users	Medium Users	Small Users
No. of Firms (1987)	2,600	72,600	184,150
1988-1993 CAGR (Percent)	23	18	16

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Leading I.S. Vendors in the Discrete Manufacturing Sector

Vendor	U.S. Sales ($ Millions) Estimated CY 1988 Revenues				
	Proc. NW	Applic. SW	Turn-key	Prof. Svcs.	Total
IBM	15	340	-	45	400
Prime	-	85	200	30	315
Intergraph	-	10	240	10	260
Mentor Graphics	-	10	145	-	155
Andersen Consulting	-	70	-	70	140
McDonnell Douglas Info. Services	15	-	70	15	100
Boeing Computer Services	95	-	-	5	100
ASK/NCA	10	10	70	5	95
CADAM (Lockheed)	-	90	-	-	90
Control Data	10	15	60	5	90
Schlumberger/Applicon	15	5	65	-	85
GE Consulting Services	-	-	-	80	80
Xerox Computer Services	10	45	10	5	70
Gerber Scientific	-	10	60	-	70
DEC	-	-	-	65	65
GEISCO	50	-	-	-	50
Computer Task Group	-	-	-	50	50
GM/EDS	25	-	25	-	50
Daisy	-	-	50	-	50
Honeywell	-	5	35	5	45
CAP Gemini America	-	-	-	40	40
Hewlett-Packard	-	30	-	10	40
System Software Associates	-	40	-	-	40
Subtotal	245 (22%)	765 (55%)	1,030 (52%)	440 (14%)	2,480 (30%)
Other Vendors	880	615	970	2,680	5,725
Total Market	1,125	1,380	2,000	3,120	8,205

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Driving Forces for IS Budgets

- Competitive pressures
  - U.S.
  - Japan
- New hardware platforms
- From batch to on-line processing

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Major IS Issues in Discrete Manufacturing

- Lack of corporate/IS strategy
- Decentralization
  - "Bootleg" buying
  - Control
  - Accountability
  - "Standards"
- Non-IS managers' IS involvement

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Impact of Technology on Discrete Manufacturing

- Moving faster than users' ability to implement
- Necessary evil in manufacturing companies
- No single-vendor solution
- Integration (read: Assistance) required

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New Applications in 1989

- Distributed processing using microcomputers
- Software linking MRP II and design automation applications
- Micro-based JiT software

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Conclusions

- Users: Limited "big picture" planning
- CIM: Much talk, little action
- Wrong focus
  - Users: One-time gains in support activities
  - Vendors: integration within, not between, islands of automation

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Recommendations to Vendors
General

- Key: Education, education, education
  - Simplify terminology
  - Build employee skills
- Sales
  - Targets: Department/plant → CIO/CEO
  - Sell the strategy first

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Recommendations to Vendors Marketing

- Goal: niche leader
- Add professional services
- Add customized solutions
- Selective alliances
- International markets

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Recommendations to Users

- Education, education, education
- Focus on information
- Change the company's vision
- Become proactive, not reactive

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Current SI Definition

- A business offering
- Complete solution to complex requirement for:
  - Information systems
  - Networking
  - Automation
- Custom selection and implementation of products and services

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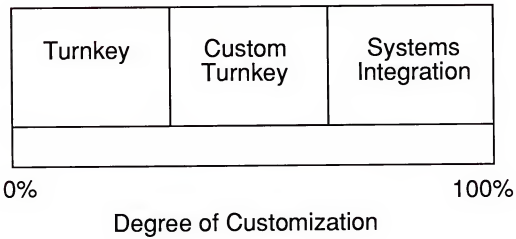
The Customization Spectrum



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SI Vendor Capabilities Needed

Ranking	Capability
1	Program management
2	System design/architecture
3	Business consulting
4	Software development

Ranked by vendors

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SI Vendor Capabilities Needed

Ranking	Capability
5	Vertical industry knowledge
6	Facilities management and operations skills
7	Software products
8	Hardware products

Ranked by vendors

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Market Forecasts

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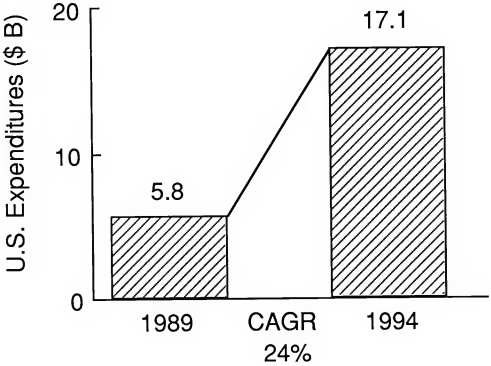
Systems Integration Market Forecast



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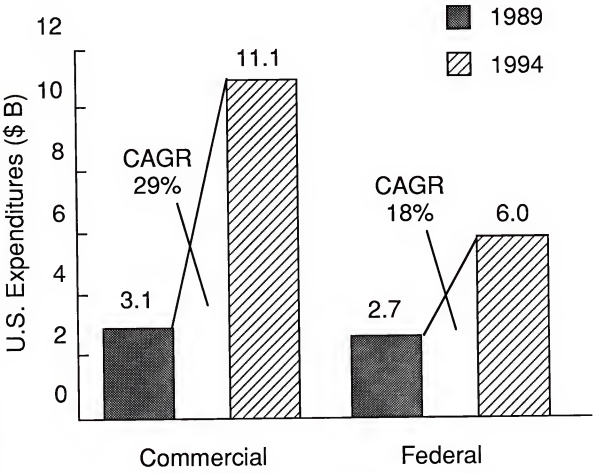
Systems Integration Market Forecast



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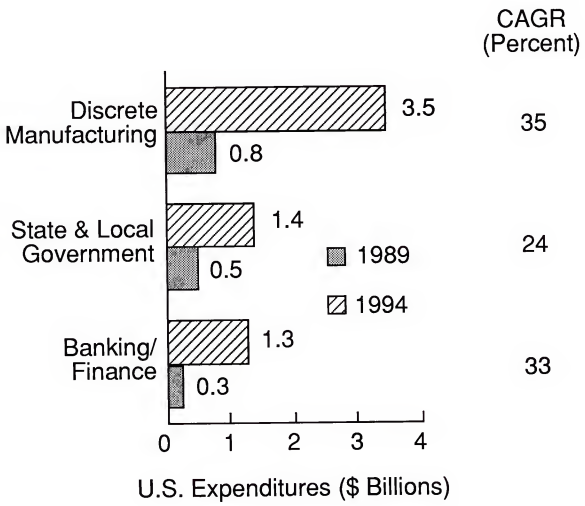
Expenditures by Industry 1989-1994



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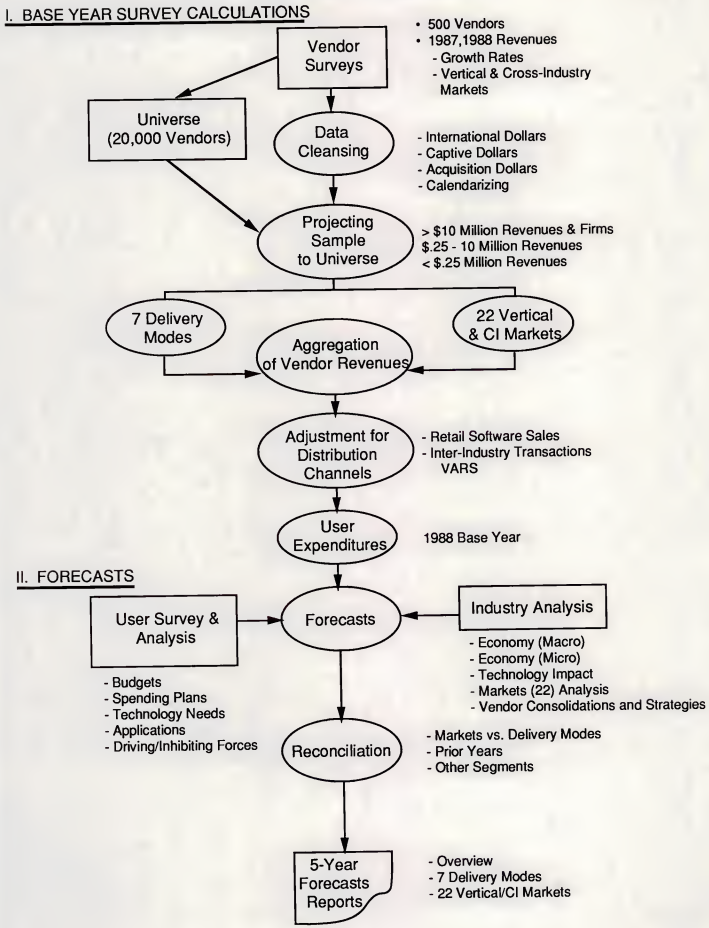

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U.S. Companies Using Manufacturing Software by Industry, 1986

Industry Segment	Total Systems*	Companies	Penetration Rate (Percent)
Automotive and Parts	2,109	3,771	55.9
Electronics and Instruments	12,631	24,498	51.6
Aerospace and Defense	760**	1,903	39.9
Fabricated Metals	5,001	29,465	17.0
Machinery and Tools	5,852	55,512	10.5
Consumer Durables	2,589	32,119	8.1
Transportation and Construction	2,864	53,383	5.4
Process Industry	3,445	147,834	2.3
Total	35,251	348,485	10.1

Source: U.S. Census Bureau

* Total systems include replaced packages within the installed base figure, therefore penetration rate may be 30% lower than shown.

** Includes first-tier contractors, not lower-tier suppliers.

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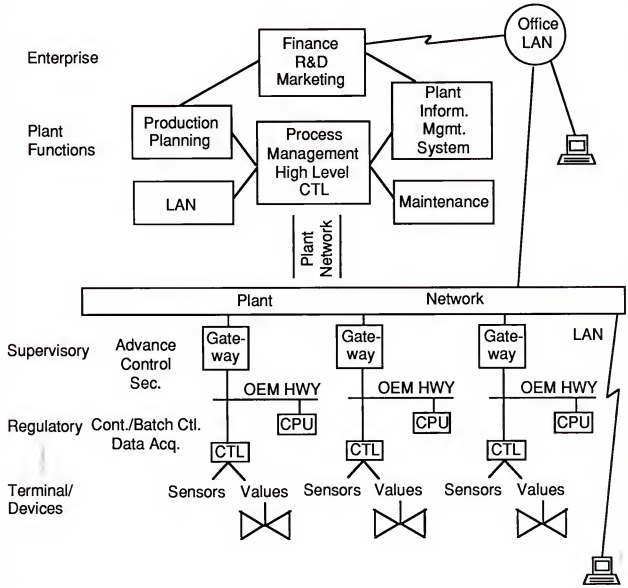
Enterprise-Wide Automation Model



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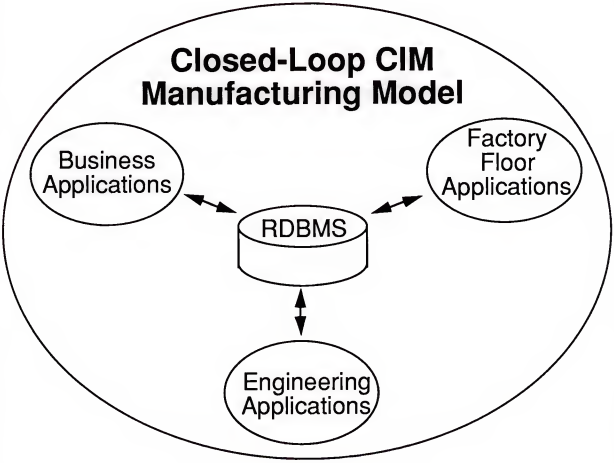

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Process Manufacturing Driving Forces

- International competition
- Customer service support demands
- Government controls (price, safety)
- Economy
- Commodity pricing
- Shortening product life cycles
- Coordinated planning of corporate business and shop-floor management

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Trends in Process Manufacturing IS Technology Use

- EDI (closer vendor, customer ties)
- Enterprise-wide/worldwide communications linkages
- Distributed processing
- Global data management
- Product customization/application development tools
- Embedded expert system, functionality
- CIM solutions

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Definition

Systems Operations
(Facilities Management)

- Processing services
  - Vendor-owned equipment
- Professional services
  - Client-owned equipment

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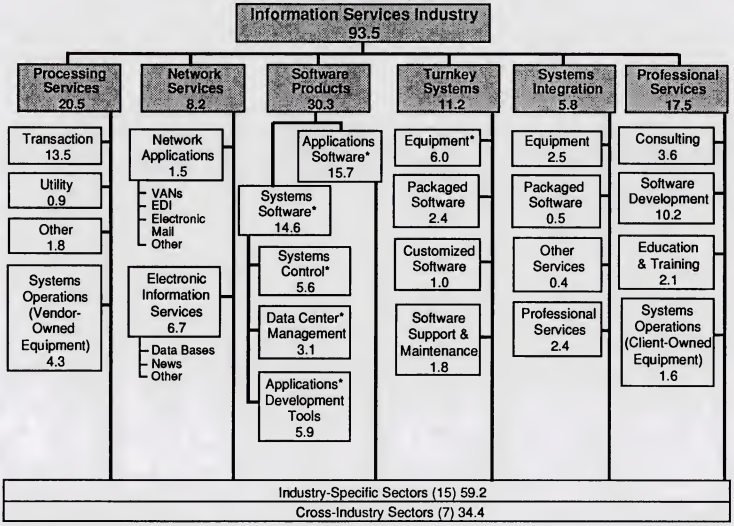
Information Services Industry Structure—1989
($ Billions)



*Broken out by Workstation/PC, Minicomputer, and Mainframe segments

Source: INPUT

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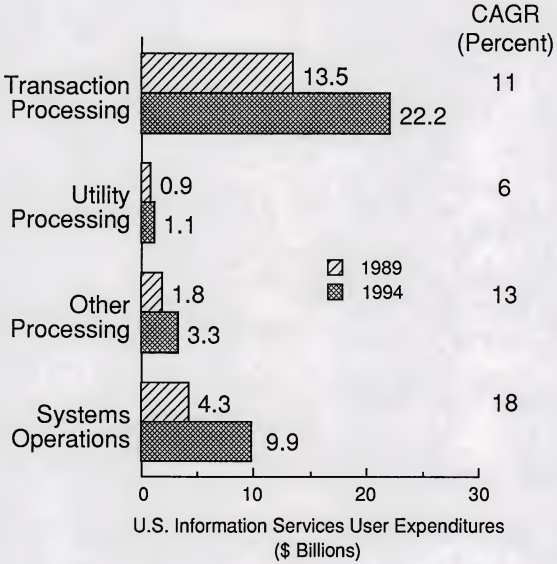
Processing Services Forecast by Submode



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Emerging Opportunities
Systems Operations

- Fastest-growing segment of processing market—18% CAGR fueled by:
  - Changing attitudes of IS executives
  - Systems integration "drag"
  - Shortages of in-house staff
- Emerging component of hardware vendors' strategies

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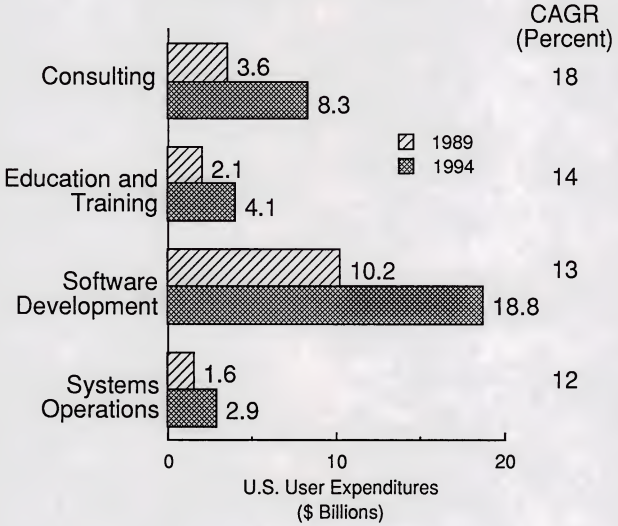
Professional Services Markets Forecast



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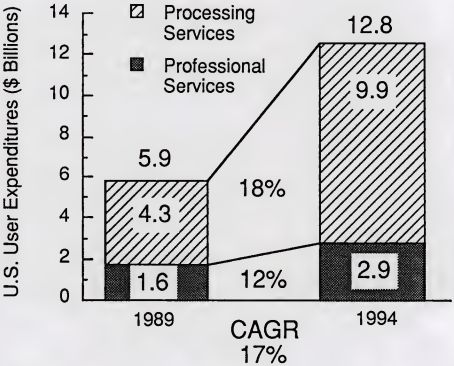
Systems Operations Forecast by Delivery Mode 1989-1994



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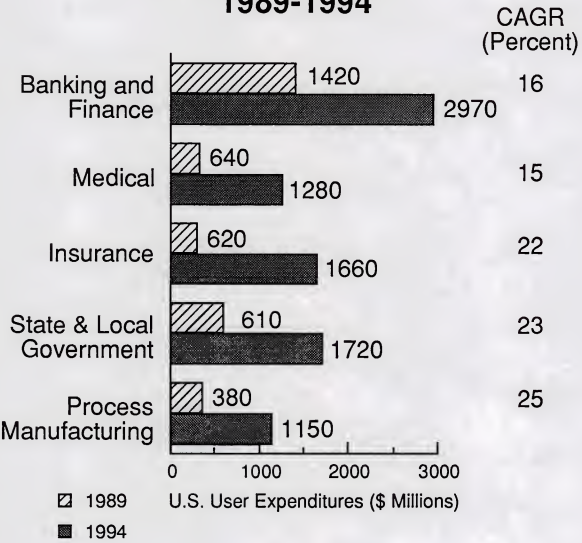
Systems Operations (Processing Services) by Industry Sector 1989-1994



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Systems Operations

Driving Forces

- Tight labor markets
- Difficulty in paying competitive salaries
- Cost of upgrading systems
- Backup requirements
- Systems integration creates opportunities

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Trends in Systems Operations

- Network management contracts
- Development as well as operations included in agreements
- Shared resources approach
- Mixed hardware offerings
- Vertical market focus
- Long-term contracts for processing services

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Systems Operations

Selected Leading Systems Operations Vendors and Market Shares, 1988

Vendor	Market Share (%)
EDS	16 *
Computer Sciences	5
McDonnell Douglas	4
Shared Medical Systems	3
Boeing Computer Services	3
Systematics	3

* Non-GM

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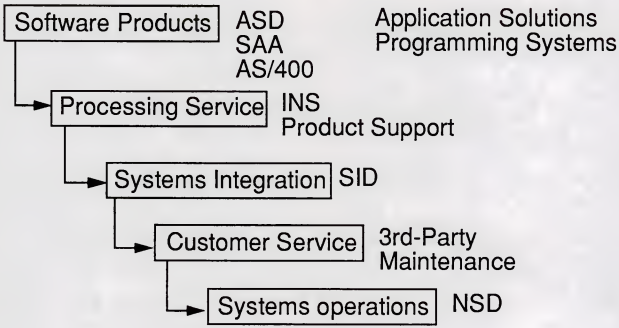
IBM as an Example



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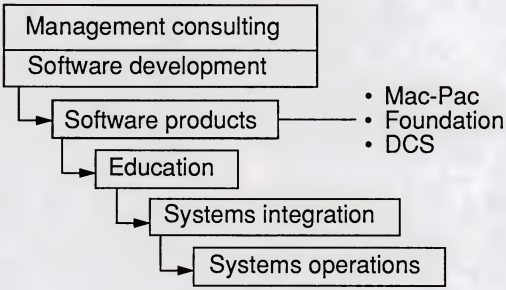
Andersen Consulting
Another Example



SI will be a "springboard into facilities management"

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Vendor Strategies

- "Shared resources" usage
  - "MIPS" lead commitment
- Global VANs offer flexibility
  - Can move processing easily
  - CSC, GE, McDonnell Douglas (BTI)
  - TBF limitations
- Emulation of systems integration project using SO systems
- SO account control leads to systems integration opportunities

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Systems Operations
Initial Evaluation Criteria
Buyers' View

Ranking	Criteria
1	Better or more-flexible service
2	Availability of operations skills internally
3	Lower operating expenses
4	Faster application changes
5	Data security/privacy
6	Faster new application development
7	Ability to add/delete personnel
8	Reduced capital investment requirements
9	Mission-critical application
10	Near-term cash flow improvements
11	Labor relations/unions
12	Executive time commitment

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Systems Operation Vendor Selection Buyers' View

Ranking	Criteria
1	Vendor SO experience
2	Overall cost
3	Data security and protection
4	SO performed by prime SI contractor
5	Vendor-provided hardware and systems software maintenance
6	Application software maintenance
7	Reduced capital investment
8	Near-term cash flow improvements
9	SO performed in client facility
10	Labor relations/unions
11	SO performed in vendor location

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Conclusions

- Renewed acceptance of systems operations
- Market entry by large vendors
- Track record is important
- Systems integration will provide systems operations growth impetus
- Economic factors will continue to create user demand for systems operations
- Commercial sector is most attractive
- Profits through productivity and technology leverage

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IBM National Services Division

- Will provide systems operations for customers
- 30,000 people
- Works with IBM's SID and INS operations

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IBM National Services Division

- Provides all "operations support" functions
  - Data center design and building
  - Remote, "Lights-out" data center operations
  - Hardware/software/network maintenance
  - Disaster recovery
  - End-user software support
  - Systems operations studies
  - Conversion services

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IBM

- Fundamental changes
  1. Sales incentives for services
  2. Willingness to provide systems operations services

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Boeing Computer Services

- Systems Integration Emphasis
  - Federal government
  - State & local government
  - Universities
  - Utilities
- Processing Services
  - Supercomputer services
  - Declining non-federal "utility" services

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Aerospace Companies

- Litton Computer Services
- Provides "computer utility" processing services
  - $30M revenues
  - "Packaged" pricing
  - Emphasis in Los Angeles

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European Companies

- Hoskyns:
  - Very successful in FM
  - Good "computer utility" model
  - Avoided industry specialization
- Thorn-EMI
  - Also successful in processing utility
- SD-Scicon, GSI, Sema-Cap, others
- PTTs becoming more aggressive

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Key Business Trends

- Globalization
- Specialization/Integration
- Pace of change

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Evolution of CIO Role

- Role will not disappear
- Same objectives/problems
- More focus on strategy/planning
- Less focus on systems development/operations
- Stronger focus on telecom/network

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Implications for Computer Utility

- Some opportunities, particularly in less information intensive companies
- Decentralizing provides opportunities in business units
- "Compute Utilities" may have to operate within the framework of the corporate network

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Pricing

- Key pricing issues for the SO buyer are:
  - Predictability
  - Control
  - Price performance
  - "Futures"

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Pricing

- "Computer Utility" is usually resource priced
  - "Storage" and "Connect Time" are the areas of most danger
  - Processing unit algorithms are more protected
- Successful services provide package prices
  - "Virtual machine"
  - Real, dedicated systems

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Support

- SO/FM contracts require complete, bundled support
- "Computer Utility"/resource services can "menu price" support

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"Computer Utility" Market

- Small market for super-computer computation services
- Small, transient market for compute capability only
- All markets require other value-added parameters
  - Operational, "computer-utility"
  - Applications, FM/SO

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